# Otter Population Analyses
# 2003

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## Abstract

Wisconsin's otter population has declined quite steadily from approximately 15,600 animals in 1996 to 12,900 in fall, 2003. The WDNR Furbearer Advisory Committee recommended a harvest goal of 1,200 otters for the 2003-04 trapping season which should allow for slight increase in the population increase. Results from preliminary tests of an aerial otter survey are encouraging. It appears that the survey can provide an independent index to relative otter densities and population trends for validation and calibration of our population model.

## Introduction

Kohn and Ashbrenner (1984) described earlier attempts to obtain age and reproductive data for Wisconsin otters via carcass collections. They also tested an aerial survey to estimate otter population trends, and attempted to estimate the statewide population and allowable harvests. This report summarizes and compares data collected since then, and discusses future data collections necessary to continue and refine Wisconsin's otter monitoring and harvest management capabilities.

## Methods

Wisconsin trappers are required to register their otters with the DNR. The area of kill (county and deer management unit), date of kill, sex of the animal, type of trap used, and the name and address of the trapper were recorded for each animal registered.

Trappers were also required to turn in their otter carcasses during the 2001-02 season. A canine tooth was extracted from each carcass and all teeth were x-rayed. Kits were identified by the presence of an open foramen and wide pulp cavity ($\geq$ half the tooth width) (Kuehn and Berg 1983). Teeth from otters $\geq$ 1 year were sent to Matson's Laboratory, Milltown, MT for processing and aging by counting annuli in the cementum. Ovaries were removed from all female carcasses and stored in 10% formalin until they were firm enough to hand section. The sections were then examined for presence of corpora lutea. These data, along with those obtained from previous carcass collections and harvest registration, were incorporated into a model to obtain statewide otter population estimates and trends.

Preliminary testing of an aerial survey to estimate regional otter population trends began in February 2001. The aerial survey involved recording the presence or absence of otter tracks at stream and river crossings along 30-mile long transects within each Otter Management Zone (Figs. 1 and 2). The transects selected had $\geq$ 8 stream crossings in each to provide adequate sample sizes, and were located to provide an even distribution within each Management Zone. GPS locations for the western and eastern end points of each transect were established to insure that the same transects were surveyed each year. Twenty-four permanent transects were established in the North Otter Management Zone, 21 in the Central Zone, and 25 in the South Zone.

Transects were surveyed from Cessna 172 and 182 aircraft using 2 observers plus the pilot. Surveys were conducted between 9am and 3pm on bright, sunny days 1-5 days after a

significant (>2") snowfall. Direct sunlight was required for the otter tracks to show up clearly. Clouds and long shadows over the steam/river crossings made tracks difficult to observe. The date, days since snow, cloud cover, and observers names were recorded when each transect was surveyed. At each stream/river crossing, the pilot circled the plane as low as necessary to thoroughly search for otter tracks. The presence or absence of otter tracks, and ice conditions were recorded at each crossing. A map showing the transect and stream and /river crossings was attached to the bottom of the data sheet to enable observers to follow their progress along the transect.

## Results

### Age structure and reproductive rates

Ages were obtained from 1,120 otters (643 males; 477 females) harvested during the 2001-02 season (Tables 1 and 2). We now have age data from 2,111 male and 1,552 female otters harvested to date. Age distributions were similar between sexes. Kits comprised approximately 45% of the harvest, yearlings about 22%, and adults approximately 33%. The mean age for both male and female otters harvested was 2.3 years. Of these, 6 males and 6 females were 13 years old or older with the oldest being a 15 year old male. The age structure in the harvest was very similar in all 5 collections.

Ovaries and uterine horns were collected and examined from 234 otters taken during the 2001-02 season (Table 3). Pregnancy rates (based on *corpora lutea*) for these animals were 44% for yearlings and 74% for adults. Average litter sizes were 1.8 for yearlings and 2.1 for adults. Twelve of the females necropsied contained embryos. The mean number of embryos per female was 2.1.

Mean litter sizes for yearling and adult otters, and adult pregnancy rates have remained relatively stable since otter carcass collections began in 1979. But, it appears that yearling pregnancy rates may have increased recently. Yearling pregnancy rates of otters collected during 1979-95 were only around 10% as compared to yearling pregnancy rates of around 45% for those collected during the 1998-99 and 2001-02 trapping seasons. The more recent yearling pregnancy rates may be used to update our otter population model.

### Population Estimates

Population estimates calculated by our computer model suggested that the statewide otter population increased rather steadily from approximately 12,600 animals in 1982 to 15,600 in 1996, and then declined down to 12,900 otters in 2003 (Table 4). It appeared that the population declined substantially whenever harvest rates exceeded 15% of the prehunt population. Harvests have exceeded that level during 4 of the last 7 trapping seasons. The 2001-02 harvest (2,661) exceeded our harvest goal (1,830) by 48% due to extremely good weather conditions for trapping. As a result, the statewide otter populations in fall, 2002 and 2003 were at, or slightly below, our population goal of "a minimum of 13,000 otters in the State".

The WDNR Furbearer Advisory Committee recommended a harvest goal of 1,200 otters for the 2003-04 trapping season. This includes 720 otters in the North Zone, 300 in the Central Zone, and 180 in the South Zone. The population model suggested that that level of harvest would result in a slight increase in the statewide population.

Future efforts should be directed towards improving our ability to determine otter population levels and trends in each Otter Management Zone. Development of zone-specific otter population models will require analysis of otter age and reproductive rates in each Otter Management Zone to see if they are similar, or if different values have to be used in each Zone. We will conduct the preliminary analyses now that all data are available from the carcasses collected during the 2001-02 trapping season. In addition, a population index is needed to determine regional differences in relative abundance and monitor changes in regional populations. This information is needed to calibrate zone-specific models. We are currently evaluating a potential field index within the 3 otter management zones. It may require 3-4 more years of data collections, surveys, and analyses before we can confidently make zone-specific population estimates.

Aerial Survey

Nineteen transects were surveyed in the North Otter Management Zone during January-February 2001. We encountered 191 stream and river crossings along the transects, and otter tracks were observed at 35 (18%) of them (Table 5). The frequency of otter sign observed did encourage us to conduct further testing. After these flights we established 5 additional transects in the North Zone to increase the number of stream and river crossings sampled in future surveys.

The lack of snow during the winter of 2001-02 limited further testing. We completed all 24 transects in the North Otter Management Zone, but were able to survey only 12 of the 21 transects in the Central Zone and 7 of the 24 in the South Zone during February-March of that year. Otter tracks were observed at 26% of the stream and river crossings encountered on the transects in the North Management Zone, 27% of the crossings in the Central Zone, and 4% of the crossings in the South Zone. Incomplete surveys in the Central and South Otter Management Zones did not allow us compare frequencies of otter tracks among zones.

All transects in all Otter Management Zones were surveyed during February-March of 2003, and permanent transects were established for each Zone. Otter tracks were observed at 46 (18%) of 251 stream and river crossings in the North Otter Management Zone, 29 (14%) of 205 crossings in the Central Zone, and 20 (8%) of 254 crossings in the South Zone. The frequency of otter tracks observed along the transects was much lower in the South Zone than in the Central and North Zones, and the frequency of otter sign in the North Zone was substantially lower in 2003 than in 2002. The 2003 survey should provide some of the baseline data for comparison with future surveys.

The number of otter tracks observed was impacted by light conditions. Tracks showed up very well in direct sunlight but were much harder to observe under even light cloud cover or early or late in the day when there were long shadows. Deep snow on the ground created additional problems; it completely concealed many of the smaller streams reducing the number of crossings on transects from years with less snow. In addition, it made it harder to separate otter tracks from those of other species. When snow depths on the ice were $\leq$12 inches, the drag marks made by otters sliding between bounds made it easy to separate their tracks from all other species. But, when snow depths exceed 12 inches, deer and large carnivores dragged their bellies in the snow and those drag marks made it necessary to look at the tracks more closely to identify them.

Analyses of the test data using the MONITOR program (Gibbs *et al*. 1998) showed that this survey had sufficient statistical power to be useful as an index to regional densities and

population trends. Those analyses suggested that if the survey were conducted for 5 years it would have a good chance (99%) of detecting trends of 10% or greater per year, and if it were run for 10 years it would have a good chance (99%) of detecting trends of only 3% or greater per year.

It took 45 hours of flying to survey the entire state in 2003. The total cost for aircraft and pilots was only $3,700. That is very reasonable for a statewide survey capable of determining regional otter population trends, and one that can be used to calibrate and validate our otter population model.

We feel this survey is ready for implementation as a routine survey conducted by Wildlife Management personnel. During our testing we flew most of the surveys out of Rhinelander. This required substantial ferry time between some transects, made it hard to schedule the surveys with appropriate weather conditions, and it took too long to survey all the transects with just one crew. The "window of opportunity" for this survey has been very narrow in recent years and trained observers and a pilot should be available in each Zone so the survey can be completed quickly whenever conditions are suitable. It normally takes 2-3 full days to survey each Management Zone.

It would be best to have 2 observers plus the pilot conducting the surveys the first year. After that, we found it was sufficient to conduct the survey with just one experienced observer and pilot. The surveys should be conducted 1-5 days after a significant snowfall, only on days with clear skies, and during midday (0900-1500) to avoid long shadows.

It will be necessary to start out by running the survey at least 5 years in a row to establish good baseline data for calibrating and validating our population model. Budget conditions may require that the survey be conducted only every third year thereafter. That would be unfortunate and would reduce the sensitivity of the index somewhat. Outside funding should be pursued if necessary. The low cost of the survey (less than $5,000) may make that possible.

Although it appears that otter track observation rates can be used to estimate relative densities of otters within each Otter Management Zone, it will be necessary to measure the amount of suitable otter habitat in each Zone to determine relative numbers of otters in the Zones. This should be done from GIS coverages. The amount of otter habitat and the frequency of otter tracks in each zone can then be initially used to determine the proportion of the statewide otter population present in each Otter Management Zone. Eventually those data may allow the development of individual population models for each Management Zone.

## Literature Cited

Kohn, B .E. and J. E. Ashbrenner. 1984. Harvest and population status of river otter in Wisconsin. Wis. Dep. Nat. Resour. Research Report 129. 16pp.

Gibbs, J.P., S. Droege, and P. Eagle. 1998. Monitoring populations of plants and animals. BioScience 48:935-940.

Kuehn, D. W. and W. E. Berg. 1983. Use of radiographs to age otters. Wildl. Soc. Bull. 11(1):68-70.

**Table 1.** *Percentage of male otters harvested in Wisconsin in age class, 1979-2002.*

| Age Class | 1979-80 | 1980-81 | 1981-82 | 1994-95 | 1998-99 | 2001-02 | All |
|---|---|---|---|---|---|---|---|
| Kit | 57 | 50 | 31 | 47 | 47 | 42 | 45.0 |
| 1 | 11 | 12 | 31 | 22 | 23 | 27 | 23.4 |
| 2 | 11 | 6 | 13 | 11 | 8 | 12 | 10.3 |
| 3 | 8 | 7 | 9 | 8 | 7 | 7 | 7.6 |
| 4 | 5 | 3 | 13 | 6 | 3 | 3 | 4.2 |
| 5 | 3 | 3 | 0 | 3 | 4 | 1 | 2.7 |
| 6 | 0 | 5 | 0 | 2 | 3 | 3 | 2.8 |
| 7 | 0 | 3 | 0 | 1 | 2 | 1 | 1.1 |
| 8 | 0 | 5 | 2 | 1 | 1 | 0 | 0.9 |
| 9 | 3 | 1 | 0 | 1 | 0 | 1 | 0.7 |
| 10+ | 2 | 5 | 0 | 0 | 3 | 1 | 1.5 |
| No. Aged | 37 | 119 | 45 | 663 | 604 | 643 | 2,111 |
| Mean Age (assume age class kit = 0.75 yrs; age class 1 = 1.75 years; etc.) | | | | | | | 2.3 yrs. |

**Table 2.** *Percentage of female otters harvested in Wisconsin in age class, 1979-2002.*

| Age Class | 1979-80 | 1980-81 | 1981-82 | 1994-95 | 1998-99 | 2001-02 | All |
|---|---|---|---|---|---|---|---|
| Kit | 59 | 57 | 46 | 45 | 49 | 39 | 45.5 |
| 1 | 5 | 9 | 10 | 18 | 21 | 25 | 20.1 |
| 2 | 9 | 4 | 17 | 17 | 9 | 11 | 11.9 |
| 3 | 5 | 6 | 10 | 8 | 5 | 9 | 7.3 |
| 4 | 18 | 8 | 5 | 5 | 3 | 5 | 4.8 |
| 5 | 0 | 1 | 10 | 1 | 2 | 4 | 2.7 |
| 6 | 0 | 4 | 2 | 3 | 3 | 2 | 2.7 |
| 7 | 0 | 4 | 0 | 1 | 3 | 1 | 1.7 |
| 8 | 5 | 3 | 0 | 1 | 2 | 1 | 1.3 |
| 9 | 0 | 1 | 0 | 0 | 1 | 0 | 0.5 |
| 10+ | 0 | 4 | 0 | 1 | 2 | 2 | 1.7 |
| No. Aged | 22 | 102 | 41 | 445 | 465 | 477 | 1,552 |
| Mean Age (assume age class kit = 0.75 yrs; age class 1 = 1.75 yrs; etc.) | | | | | | | 2.3 yrs. |

**Table 3.** *Reproductive data from female otters collected in Wisconsin.*

| | Trapping Seasons | | | | |
|---|---|---|---|---|---|
| Age Class | 1979-82 | 1994-95 | 1998-99 | 2001-02 | All Seasons |
| Yearlings (Age Class 1) | | | | | |
| Number examined | 9 | 94 | 82 | 94 | 279 |
| Number with corpora lutea | 1 | 9 | 38 | 41 | 89 |
| Mean number of corpora lutea | 1.0 | 1.8 | 1.9 | 1.8 | 1.7 |
| Percent pregnant | 11 | 10 | 46 | 44 | 32 |
| Number with embryos | 0 | 0 | 0 | 2 | 2 |
| Mean number of embryos | | | | 2.0 | 2 |
| Adults (Age Class 2+) | | | | | |
| Number examined | 53 | 158 | 117 | 140 | 468 |
| Number with corpora lutea | 44 | 99 | 102 | 104 | 349 |
| Mean number of corpora lutea | 2.3 | 2.2 | 2.3 | 2.1 | 2.2 |
| Percent pregnant | 83 | 63 | 87 | 74 | 75 |
| Number with embryos | 14 | 0 | 16 | 10 | 40 |
| Mean number of embryos | 2.4 | | 2.4 | 2.1 | 2.3 |

**Table 4.** *Wisconsin Otter Population Estimates and Harvests, 1982-2003.*

| Year | Prehunt Population [a] | Harvest | Harvest Rate (%) |
|---|---|---|---|
| 1982-83 | 12,580 | 960 | 8 |
| 1983- | 12,810 | 995 | 8 |
| 1984- | 13,150 | 1,213 | 9 |
| 1985- | 13,200 | 960 | 7 |
| 1986- | 13,600 | 1,588 | 12 |
| 1987- | 13,350 | 1,724 | 13 |
| 1988- | 12,970 | 1,140 | 9 |
| 1989- | 13,250 | 1,294 | 10 |
| 1990- | 13,350 | 818 | 6 |
| 1991- | 14,070 | 883 | 6 |
| 1992- | 14,740 | 1,060 | 7 |
| 1993- | 15,300 | 1,212 | 8 |
| 1994- | 15,750 | 1,900 | 12 |
| 1995- | 15,460 | 1,599 | 10 |
| 1996- | 15,570 | 2,521 | 16 |
| 1997- | 14,890 | 2,809 | 19 |
| 1998- | 13,960 | 1,631 | 12 |
| 1999- | 14,210 | 2,278 | 16 |
| 2000- | 13,760 | 1,945 | 14 |
| 2001- | 13,720 | 2,701 | 19 |
| 2002- | 12,840 | 2,034 | 16 |
| 2003- | 12,880 | --- | --- |

[a]Wisconsin's otter population goal is a preharvest minimum of 13,000 animals.

**Table 5.** *Results from aerial otter surveys conducted in 2001-2003.*

| Otter Management Zone | 2001 | 2002 | 2003 |
|---|---|---|---|
| North | | | |
| No. Transects Surveyed | 19 | 24 | 24 |
| No. Stream/River Crossings | 191 | 268 | 251 |
| % of Crossings With Otter Tracks | 18 | 26 | 18 |
| SE (%) | 4.2 | 4.1 | 3.2 |
| Central | | | |
| No. Transects Surveyed | 0 | 12 | 21 |
| No. Stream/River Crossings | --- | 128 | 205 |
| % of Crossings With Otter Tracks | --- | 28 | 14 |
| SE (%) | --- | 4.0 | 2.5 |
| South | | | |
| No. Transects Surveyed | 0 | 6 | 24 |
| No. Stream/River Crossings | --- | 86 | 254 |
| % of Crossings With Otter Tracks | --- | 5 | 8 |
| SE (%) | --- | 2.1 | 2.1 |

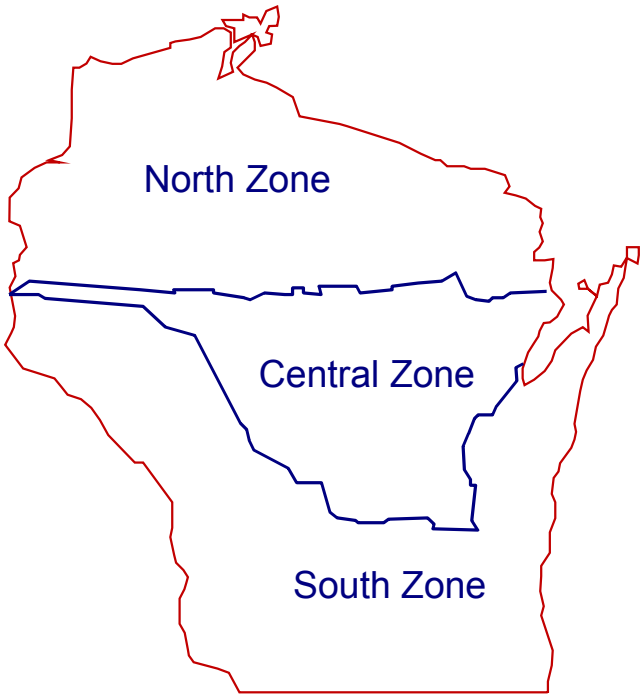


**Figure 1.** *Wisconsin's Otter Management Zones, 2003.*

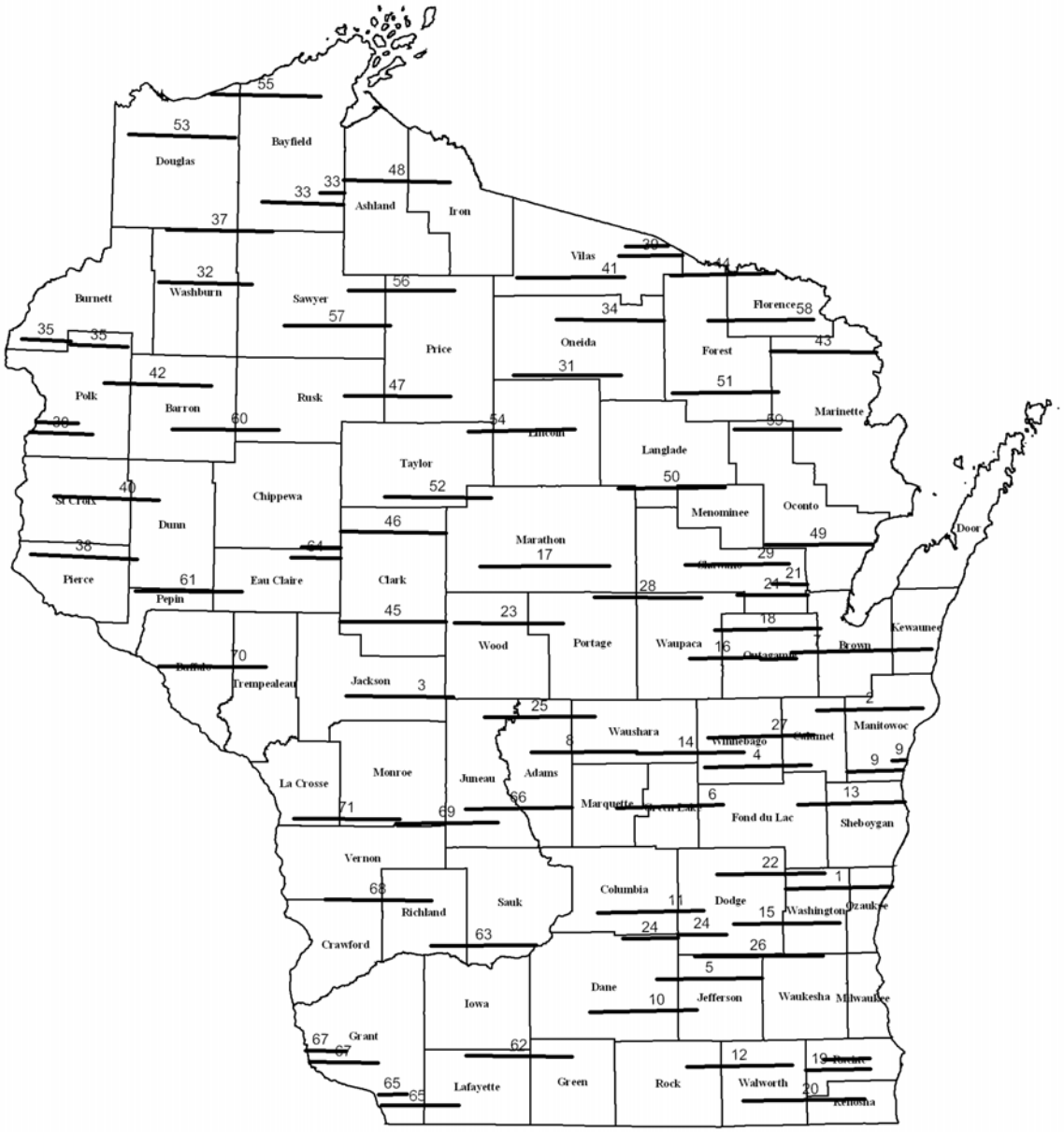


**Figure 2.** *Location of aerial otter transects in Wisconsin.*